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The Financial Impact of a Healthy Eating Intervention in a Government Worksite Cafeteria

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The Financial Impact of a Healthy Eating Intervention in a Government Worksite Cafeteria

Capstone Project Paper

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By Andrew M. Wheeler RD, LD

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Abstract:

Unhealthy eating habits are associated with a greater risk of obesity and many chronic diseases. Historically, public health nutrition interventions have focused on education of the individual to induce dietary behavior change. However, given that many factors influence food choices, more comprehensive interventions that address these multiple factors are needed. Worksite cafeterias provide a unique opportunity to intervene at multiple levels of influence on employees eating habits. In this paper we used cafeteria sales data to evaluate the changes in purchases and the financial impact of implementing a healthy eating intervention using an environmental change and various promotional efforts to promote healthier food choices in a government worksite cafeteria.

Introduction

Unhealthy eating habits are associated with a greater risk of many chronic diseases such as cardiovascular disease, hypertension, type 2 diabetes and diet-related cancers [1]. A poor diet ranks as the leading risk factor for death and one of the top three risk factors for disability in the United States [2]. Collectively with other factors, unhealthy dietary patterns have led to approximately 75% of men and 67% of women aged 25 and older being overweight or obese [3]. Obesity and its associated comorbidities make the promotion of healthy food choices of prime importance in the field of nutrition and public health.

For decades there has been an effort to develop interventions to induce dietary behavior change. However, making dietary changes can be difficult as there are many factors that influence the foods that individuals choose to consume on a daily basis. The factors that have been found to influence food choices the most are family, friends, advertising exposure, availability of nutrition information, socioeconomic status, culture, taste preference, food availability and price [4-10]. These multifactorial influences make developing interventions to sustainably change individuals' food and beverage choices very challenging.

Historically, public health nutrition interventions have focused on education of the individual. For example, there have been large education campaigns to improve knowledge and attitudes through programs such as the "Fruits and Veggies-More Matters [11,12]." While education of an individual can have modest success at changing behavior, the lack of a comprehensive intervention to address the multiple levels of influence on food choices has failed

to provide sustained dietary change for the United States population [5]. In comparison, health promotion interventions that use the social ecological model to intervene at multiple levels of influence, have the potential to have sustained success in positively changing eating behaviors [13-15].

One particular promising approach to address unhealthy eating habits, is to intervene in a workplace setting using the social ecological model to help guide the intervention. Worksites provide a unique opportunity to intervene at multiple levels of influence. Previous research has shown that various techniques can be used in workplace settings to positively influence employees eating habits. Positive changes in purchasing habits have been found with worksite cafeteria environmental changes, such as offering healthier options [16], reducing prices of healthier options [17], and point of purchase decision prompts [18].

In 2014, the Kentucky Department for Public Health (KY DPH) conducted a worksite wellness evaluation and found that 78% of the sampled employees were either overweight or obese, 31% had diabetes or pre-diabetes, and 44% had hypertension [19]. In response to these findings, along with suggestions from employees requesting healthier food options, the KY DPH decided to implement a healthy eating intervention using an environmental change in the cafeteria and various promotional efforts to promote healthier food choices in their cafeteria. An existing local healthy-eating brand, Better Bites (BB) [20] was used to highlight the healthier menu items.

During the planning of this intervention, there was concern from cafeteria management (Kentucky Department for Parks) that offering healthier entrees at a

reduced price could lead to a reduction in total revenue for the cafeteria. With this concern, cafeteria management agreed to offer BB entrees on twelve consecutive Wednesdays as long as sales data was analyzed. For this reason, our primary objective was to analyze if offering healthier menu options at a reduced price would negatively impact total sales revenue for the cafeteria. Sales data was also used to determine if any changes in revenue could be attributed to an increase or decrease in BB entrees sold. It was particularly important to investigate the financial sustainability of this intervention, to determine whether offering healthier entrees will be economically feasible for this government cafeteria in the future. It was hypothesized that providing healthier entrees at a reduced price would lead to increased total sales revenue for the cafeteria. Secondly, we wanted to investigate if offering healthier entrees had an impact on the purchasing habits of the customers. Lastly, we wanted to determine if sales of BB entrees would continue after promotional efforts were discontinued.

Methods

Description of the BB Healthy Eating Intervention

The BB healthy eating intervention consisted of introducing and promoting BB entrees to the approximately 1,200 KY DPH employees in their centrally located cafeteria. The recipes for BB entrées were developed by a chef and a Registered Dietitian to meet the nutrition guidelines defined by the BB brand. These guidelines are based on the 2010 Dietary Guidelines for Americans and the Health and Human Services (HHS)/ General Services Administration (GSA) Health and Sustainable Food Guidelines [21,22].

Figure 1 below presents the nutrition requirements for BB entrees.

Figure 1. Better Bites Entrée Nutrition Requirements	
Nutrient	**Entrée/ per serving**
Calories	≤ 500
Fat	Items may not be fried
Added sugar	≤ 8 grams
Sodium	<750mg
At least 2 of these nutrients in amounts listed	
Protein	6 grams
Fiber	4 grams
Vitamin A	15% of DV (daily value)
Vitamin C	15% of DV
Iron	15% of DV
Calcium	15% of DV
A Better Bites entrée must have at least two of the following: • ½ cup of fruit • ½ cup of vegetables • 1 serving of whole grains • 2 ounces of lean meat or ½ cup beans or ¼ cup nuts or seeds or 1 egg or 1⁄4 cup tofu • Dairy product- milk, yogurt, cheese (1/2 cup of milk or yogurt, 1 ounce of cheese	

Due to limited personnel resources, we were not able to directly analyze the nutrient content of the non-BB entrees sold in the cafeteria. However, most non-BB entrees were found to be of low nutrition quality due to the high amount of options that were fried, contained refined grains, and lacked fruit and vegetable content. Additionally, the non-BB entrees were not held to any specific nutrition guidelines.

Various strategies were used to encourage customers to try the BB entrees. During the first six weeks of offering BB in the cafeteria, BB entrees were sold for a dollar less than non- BB entrees, maximizing the affordability of the healthier entrees. The price of the BB entrees returned to the non- BB entrée price during the last six weeks of the intervention. In addition to providing a

financial incentive to purchase BB entrees, various promotional efforts were used to promote the healthier entrees. These promotional efforts included customer incentives and Point of decision prompts. Customer incentives included repeater eater loyalty cards (buy four BB entrees and receive a five-dollar gift card) and raffle prizes (tumblers, t-shirts, five-dollar cafeteria gift cards, and a 1-night stay in a Kentucky state park). Point of decision prompts included BB signage, nutrition education displays, taste testing of the daily BB entrée being served, and weekly reminder emails of the BB option for each day. Prior to offering BB entrees, each cafeteria employee received training on the intervention and an overview of the promotional efforts.

Figure 2 below provides a summary of the BB intervention, including the promotional efforts and incentives used during each time frame in the government cafeteria.

FIGURE 2. SUMMARY OF BETTER BITES INTERVENTION

	Time period		
	T1: First Six Wednesdays	T2: Second Six Wednesdays	T3: Third Six Wednesdays
BB ENTREES OFFERED	No	Yes	Yes
BB SIGNAGE	No	Yes	Yes
FREE SAMPLING OF BB ENTREES	No	Yes	No
$1 OFF OF A BB ENTREE	No	Yes	No
NUTRITION EDUCATION DISPLAYS	No	Yes	No
RAFFLE PRIZES (EXAMPLES: TUMBLERS, T-SHIRT, GIFT CARDS, FREE STATE PARK STAY)	No	Yes	No
WEEKLY EMAIL REMINDERS	No	Yes	No

Data Collection

This study compares cafeteria sales prior to, during and after the implementation of the BB healthy eating intervention. Sales data were collected at three different time frames. Time 1 (T1) refers to the six Wednesdays prior to the introduction of the BB entrees in the cafeteria. Time 2 (T2) refers to the six Wednesdays in which BB entrées were offered and promoted in the cafeteria. Time 3 (T3) refers to the six Wednesdays following the promotion period in which BB entrees continued to be sold, but without promotional efforts, other than BB signage.

The Kentucky Department of Parks, which manages and operates the government cafeteria, provided lunch sales data for each of the three-time frames for a total of 18 Wednesdays. Sales data included total entrees sold, non-BB entrees sold, BB entrees sold, and total revenue from all lunch sales. Since the cafeteria is not managed by the KY DPH this was the data that was available to analyze, and additional measurements were not able to be collected. This research received a IRB waiver from the University of Kentucky Institutional Review Board due to the use of unidentifiable sales data.

Statistical Analysis

Descriptive statistics (mean, standard deviation) for key variables were calculated and after examining the skewness and kurtosis of the outcome measures, none were found to violate the assumption of normality. One-way analysis of variance (ANOVA) tests were carried out to determine if there was any change in average daily revenue for the cafeteria during the offering of

BB entrees (T2 and T3) compared to baseline cafeteria revenue (T1). To evaluate if offering BB entrees changed the purchasing habits of customers, one-way ANOVA tests were run to determine if there was a difference in the number of non-BB entrees sold during T2 and T3 compared to T1. We also used one-way ANOVA tests to determine if there was a difference in the number of BB entrees sold compared to non-BB entrees sold within T2 and T3. We used one-way ANOVA tests to evaluate if revenue from BB entrees contributed more to total revenue when compared to non-BB entrée revenue and other cafeteria revenue. All analyses were performed using SPSS version 22.

Results

Lunch sales data from eighteen consecutive Wednesdays was collected and analyzed. The mean total revenue for lunch sales was $715.44 during T1, $950.82 during T2, and $830.57 during T3. When analyzing if there was any change in average daily revenue for the cafeteria during the offering of BB entrees, we found that there was no significant difference in average total revenue of lunch sales between T1 and T3 ($p=0.1579$) or T2 and T3 (2.57, 0.1400). However, there was a significant increase in average total lunch sales revenue between T1 and T2 ($p=0.0153$) (Table 1, Graph 1).

Overall, the mean total number of entrees sold were 73, 236, and 122 for T1, T2, T3 respectively. Data on the number of entrees sold was collected for each Wednesday and averages for each time period are presented in Table 2. In T1 an average of 73 non-BB entrees were sold. During T2, an average of 206 BB entrees and 30 non-BB entrees were sold. BB entrees made up 87.3% of all

entrees sold during T2. In T3, an average of 82 BB entrees and 40 non-BB entrees were sold. BB entrées made up 66.7% of all entrees sold during T3.

During T2 ($p = <0.0001$) and T3 ($p=0.0014$) there was significantly more BB entrees sold compared to non-BB entrees. However, there was a significant decrease in BB entrees sold between T2 and T3 ($p = < 0.0001$). When comparing differences in purchases for non-BB entrees, there was significantly less non-BB entrees purchased during T2 compared to the T1 ($p=0.0267$). However, there was no difference in the number of non-BB entrees sold between T1 and T3 ($p=0.0812$). There was also no difference in non-BB entrees sold between T2 and T3 ($p= 0.1733$) (Table 2, Graph 2, 2a, 2b).

When comparing revenue from BB entrees to the alternative revenue sources during each time frame, we found that during T2, revenue from BB entrees was significantly more than non-BB entrees ($p<0.0001$) and other cafeteria revenue ($p<0.0001$). In T3, there was no difference in revenue from BB entrees compared to other cafeteria revenue ($p =1.000$). However, there was still significantly more revenue from BB entrees than non-BB entrees in T3 ($p = 0.0006$) (Table 3, Graph 3).

Discussion

The main finding from our intervention was the cafeteria did not have a reduction in average total revenue during either T2 or T3 compared to T1. Despite BB entrees being sold for a dollar less than non-BB entrees in T2, average total revenue actually increased in T2 compared to T1. This finding is consistent with previous research that offering healthier foods at lower prices

does not reduce overall revenue for a cafeteria [23]. This increase in revenue was mainly the result of an increase in total entrees sold. The increase in entrees sold were mainly the result of BB entrees, which made up 87.3% of all entrees sold in T2.

It is important to note that during the increase in revenue, sales of non-BB entrees decreased significantly from 73 in T1 to 30 in T2. This was a positive finding as it illustrates that customers were either modifying their purchasing habits in favor of healthier options or that offering and promoting healthier entrees attracted new customers to the cafeteria. Our findings are consistent with previous research that the promotion of healthier entrees in cafeterias leads to improvements in food choices by customers [18,24,25].

In the six weeks after promotional efforts for BB ended, we found that customers continued to purchase a higher percentage of BB entrees compared to non-BB entrees. This suggests that the promotional efforts may have had a lasting impact on the purchasing habits of some employees. It was unfortunate to find that purchases of non-BB entrées returned to baseline following the promotion period. While the difference between 73 non-BB entrees sold in T1 and 40 non-BB entrées sold in T3 appears to be significantly different, statistically it was not. It is possible, however, that the small sample of six days in each time frame contributed to not finding a significant difference between non-BB entrees sold in T1 and T3 due to the smaller differences in mean values.

Strengths and Limitations:

One of the strengths of this study's methods included the multiple levels of influence within this nutrition intervention. Individual level influence came in the form of nutrition education displays and pamphlets, information on Better Bites, and taste testing of the BB entrees. This was intended to educate the customer on the benefits of making healthier food choices and eliminate the barrier to trying new foods. The environmental and institutional change came in the form of cafeteria management agreeing to produce and offer Better Bites entrees in the worksite cafeteria. In terms of our analysis, having sales data from three different time frames was a strength. Collecting baseline sales data, prior to the BB intervention, allowed us to determine if there were any differences in purchasing habits or sales revenue during the time frame when BB entrees were offered.

While our intervention has some encouraging findings, there are some limitations we must consider. In our study we had access to total revenue but did not have access to the cost to produce non-BB entrees or BB entrees. Without this information we are not able to draw conclusions on the profitability of selling the healthier entrees compared to less healthy entrees. Also, we are not able to determine the degree of dietary change that results from choosing a BB entrée over a non- BB entrée, since non-BB entrees were not officially analyzed for nutrition content.

It is also important to note that some of the "other revenue" from lunch sales includes purchases that could be consistent with BB nutrition guidelines and others that would not be. Purchases under this category included the salad bar and other items such as soft drinks, candy bars, chips, high sugar content

granola bars and other prepackaged snacks foods. The salad bar purchases were included in the other category due to the wide variety of options on the salad bar that would have made it challenging to categorize the purchase based on BB guidelines. The relatively short duration of our intervention and the small sample of data could also be considered limitations. A longer duration for each time period may have allowed for detection of smaller differences in mean sales data between the different time periods.

Another limitation is that BB entrees and the promotional efforts for BB entrees were introduced at the same time (T2). Because of this we are not able to determine which part of the intervention had the greatest influence on the sale of BB entrees. If we had complete control over the implementation of this intervention it would have been beneficial to have BB entrees offered in T1 without any promotional efforts. This would have allowed us to compare BB sales data before, during, and after promotional efforts and determine if the promotional efforts made an impact on the sale of the healthier entrees.

Implications:

The results from this intervention suggest that offering healthier entrees at a reduced price along with various promotional efforts can positively improve employees purchasing habits while not sacrificing any financial losses in revenue for the cafeteria. These favorable results have led to cafeteria management agreeing to offer at least one Better Bites entrée in the cafeteria every Wednesday. Increasing the number of healthy options offered in worksite cafeterias is consistent with Institute of Medicine and Centers for Disease Control

and Prevention recommendations for healthier worksites [26]. The positive sales data that we present will likely be beneficial for garnering long-term support from cafeteria management and may allow for additional healthy eating interventions or the development of healthy food procurement policies. Healthy food procurement policies help to ensure that healthy food options are available and have been found to help increase the purchases of healthy foods while decreasing the purchases of unhealthy foods [27,28].

Additional research may be beneficial to investigating which of the promotional efforts had the greatest impact on the purchasing habits of the customers. It may also be beneficial to conduct qualitative research on how worksite cafeteria interventions, impact the social environment of the workplace. In conclusion, public health worksites have an obligation to serve as examples of health promoting worksites. This research may be the first step in providing a successful model that could be used by other worksites, which may have the potential to reach wider audiences and have a large health promoting impact. The implementation of similar programs should be considered for other worksite cafeterias.

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Appendix. Tables and Graphs

Table 1. Average Total Revenue Across Time Frames			
	T1 Mean, SD	**T2 Mean, SD (F, p^1)**	**T3 Mean, SD (F, p^2)**
Total Revenue ($)	715.44, 140.05	950.82, 139.15 (8.53, 0.0153)	830.57, 120.24 (2.33, 0.1579)
Note: [1]F test comparing T1 vs T2, [2]F test comparing T1 vs T3			

Graph 1.

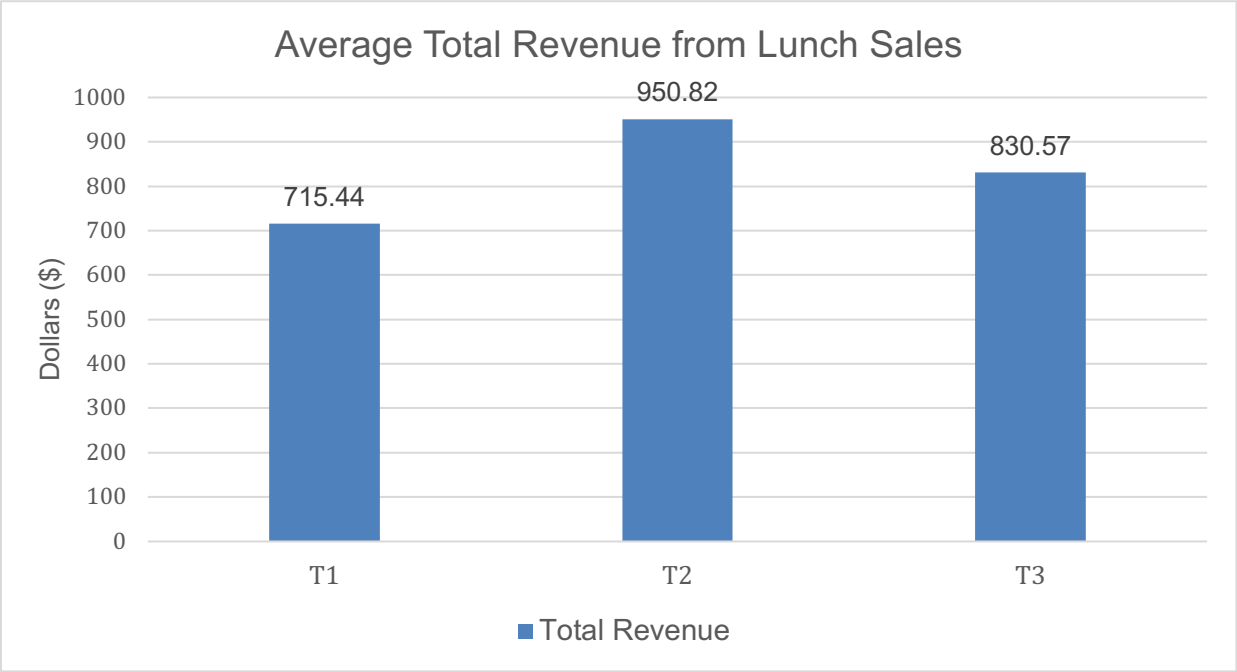
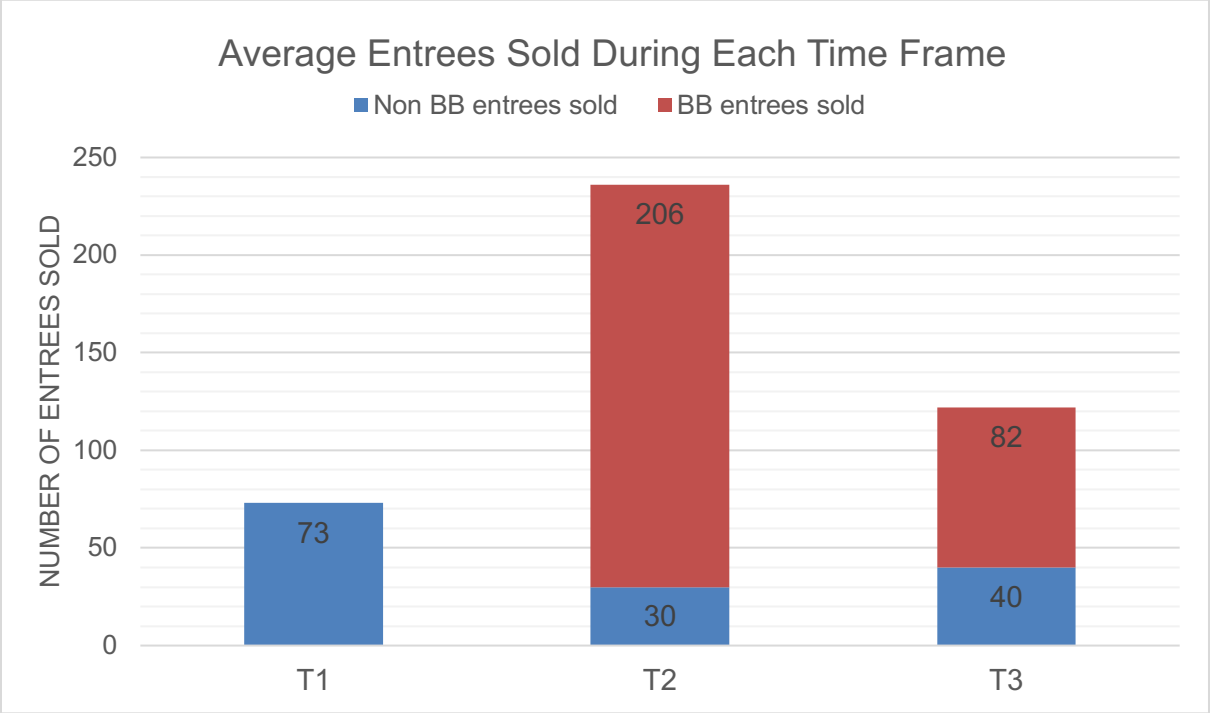
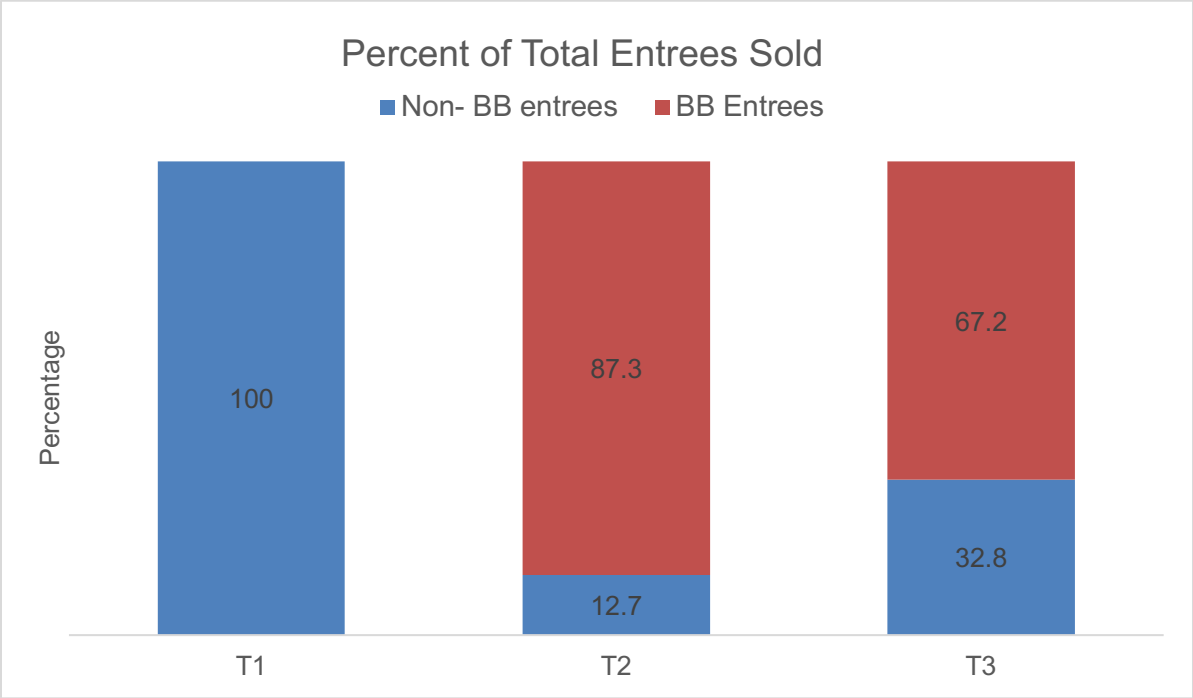


Table 2. Comparison of Average Daily Entrees Sold by Type of Entrée						
	Time Frames Mean, SD			**Test statistic: Between time frame comparison**		
	T1	**T2**	**T3**	**T1 vs T2**	**T1 vs T3**	**T2 vs T3**
Non-BB entrees sold	72.8, 38.9	29.8, 11.6	40.3, 13.2	F= 6.74, p = 0.0267	F =3.76, p= 0.0812	F= 2.15, p= 0.1733
BB entrees sold	N/A	205.8, 31.3	81.8, 19.0	N/A	N/A	F= 68.69, p= <0.0001
Test statistic: Within time frame comparison	N/A	F= 166.67, p= <0.0001	F= 19.29, p= 0.0014			

Graph 2.



Graph 2a.



Graph 2b.

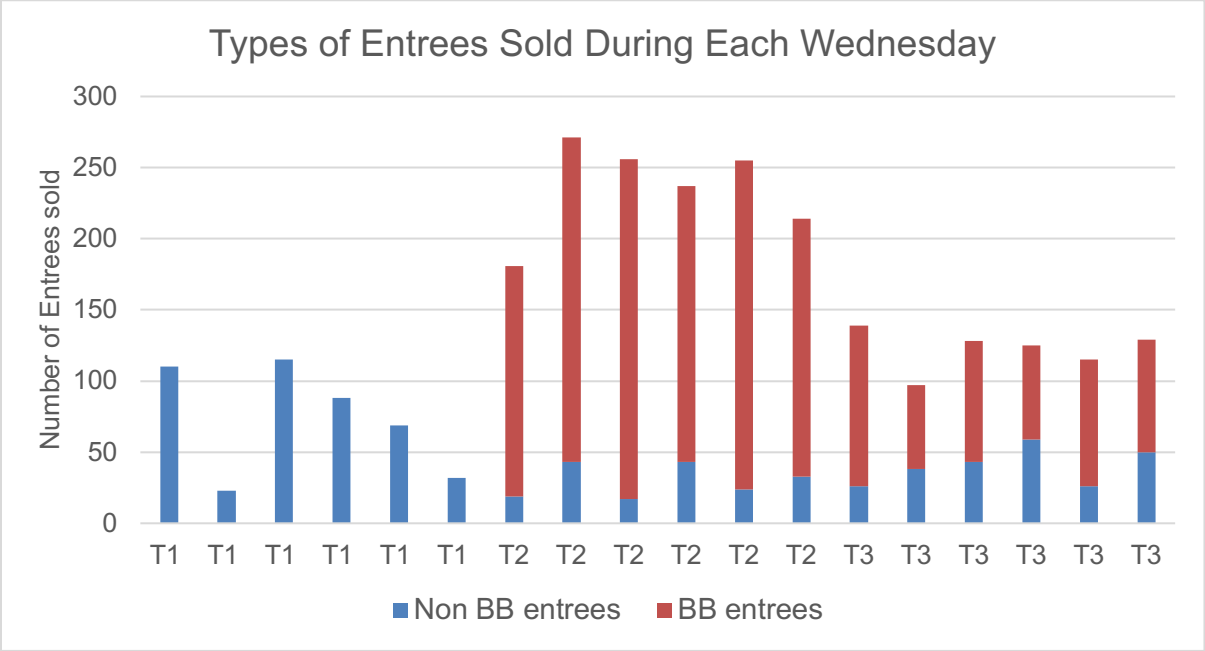


Table 3. Comparison of Average Daily Revenue by Source of Revenue			
	BB entrée Revenue ($) Mean, SD (F, *p*)	**Non-BB entrée Revenue ($) Mean, SD (F, *p*[1])**	**Other Cafeteria Revenue ($) Mean, SD (F, *p*[2])**
T2	641.78, 129.17 (REF)	127.10, 43.34 (85.62, <0.0001)	181.94, 29.27 (72.33, <0.0001)
T3	334.28, 68.30 (REF)	164.63, 50.77 (23.85, 0.0006)	331.66, 141.67 (0, 1.00)
Note: [1]F test comparing BB entrée Revenue vs Non-BB entrée revenue, [2]F test comparing BB entrée revenue vs other cafeteria revenue			

Graph 3.